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UNCF/Merck Fellow Muyinatu A. Lediju Bell


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Muyinatu A. Lediju Bell does post-doctoral work in computer science and radiology with the support of a UNCF/Merck Science Initiative fellowship. Her work aims to eliminate clutter in ultrasonography. Clutter, she explains, can make ultrasound images unclear and tissue abnormalities like cancer harder to detect. The fellowship also supported her graduate research.

Merck Science Initiative fellowships are administered by the UNCF (Washington, DC, uncf.org). Merck Fellows meet at least once a year, and the regular contact creates a bond among the recipients.

"It's a great program that helps African Americans succeed," she says. "I'm honored to be involved. It helps me do work that interests me and benefits the scientific community."

Breaking ground in medical imaging

Bell earned a BSME with a biomedical engineering minor at Massachusetts Institute of Technology (MIT, Cambridge) in 2006, then headed to Duke University (Durham, NC) for grad school. In 2009, she received a Whitaker International fellowship, awarded for work that supports international collaboration among laboratories. She took an academic leave of absence from Duke and spent a year in the United Kingdom as an academic visitor at the Institute of Cancer Research and Royal Marsden Hospital.

Her work there focused on using ultrasound imaging to help cancer patients undergoing radiation therapy by monitoring the natural movement of organs as the patient breathes. The work is significant because as a tumor moves during respiration, the radiation treatment aimed at it may irradiate healthy tissue instead of the tumor. "This is now an aspect of my current research," Bell explains.

As her dissertation research at Duke continued, her focus narrowed to clutter reduction in ultrasound imaging. At the time, the Duke lab didn't have funding for her project, but the UNCF/Merck fellowship did.

Bell's work paved the way for new processing methods to reduce acoustic clutter that obscures images of organs and internal structures. A patent is pending on the Short-Lag Spatial Coherence (SLSC) imaging she co-invented during her dissertation research. Her dissertation focused on imaging the heart but the technology can be applied to other organs. She received her doctorate in 2012.

Bell often does preliminary tests of new image-processing techniques on her computer. But once she develops a new idea, she works with a clinical team to test the ideas on ultrasound images of real people.

"I'm not a medical doctor, so I need to collaborate with them to develop technologies that will be useful for hospitals and health centers around the world," she says. "As an engineer, my strength is providing solutions to problems they are facing in the clinic and use advanced techniques to give them the clearest possible images for diagnosis and treatment."

Her postdoctoral research at Johns Hopkins University (Baltimore, MD) is currently focused on brachytherapy treatment for prostate cancer, in which tiny metal radioactive seeds are implanted in the prostate. Once in place, the seeds can be difficult to locate with ultrasound because of poor acoustic contrast with the surrounding tissue. Bell is investigating a photoacoustic imaging method that combines light emission through the urethra, optical absorption, sound generation, and novel clutter-reduction methods like SLSC to generate a clearer image. She has conducted the world's first live animal trials to demonstrate feasibility.

She's on target to complete that work in 2014 or 2015. She'd like to become a university professor and direct a research lab that works with novel imaging solutions for cancer detection and treatment.

Growing up in Brooklyn

As a youngster, Bell excelled in math and science at Brooklyn (NY) Technical High School. One day, instead of going to track practice, she and some fellow track team members attended a program to introduce females to engineering. Biomedical engineering immediately appealed to her desire to help others.

"That's where I learned what engineering meant, that it's about solving real-world problems to help people," she says. "I've been gung ho about engineering ever since."

Her older brother suggested she apply to MIT, but her guidance counselor discouraged her. He didn't think she would be admitted. She was the captain of her track team, and he thought MIT candidates preferred playing chess. However, her teachers, who knew how motivated she was and how well she performed in class, were more encouraging.

"I guess I didn't fit the guidance counselor's model of an MIT student, but in reality I was a prime candidate," she says. "My classmates at MIT had all kinds of interests. I graduated with a 4.7 GPA.

"Sometimes people who are trying to help are not so helpful, particularly if they have an unclear view of your plans, potential and talents," she remarks. To those who may be in a similar situation, Bell says, "Filter all the information you receive, be clear and confident about your goals, and let nothing stop you from achieving them." *D/C*

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University of Michigan's Claire Boland

Lighter cars can get better mileage, and natural material in cars also reduces carbon dioxide emissions over the life of the car. That's why Claire Boland is evaluating natural fibers like hemp and kenaf that can be used to make lighter composites for car interiors.

At the University of Michigan School of Natural Resources and Environment (Ann Arbor), Boland models lifecycle assessments of automotive parts made with natural fiber composites while she earns her masters degree in sustainable systems. Her project is funded by Ford Motor Company as part of a larger research grant to quantify the effects of using sustainable materials in automotive components.

"Each model will show the savings realized using one of ten different natural fiber composites," she says. The title of her thesis is "Sustainable Materials Selection Tool: Life Cycle Assessment of Natural Fiber Composites for Auto Applications."

Boland entered the university's graduate program in September 2012 and started working on the project in January 2013 with a stipend and tuition paid by Ford Motor Company. At the same time, the Ford project was getting underway and the professor she contacted to be her advisor was involved. She fit into the project perfectly.

Finding a direction

Boland grew up in Boston, MA. Her parents always encouraged her and her younger brother to follow their own interests. He's now an engineering graduate of the University of Wisconsin (Madison) and works in engineering design. Her father is Irish, her mother American, so Boland has dual citizenship.